Cell Transport Mechanisms

Question Paper 4

Level	A Level
Subject	Biology
Exam Board	Edexcel
Topic	Exchange and Transport
Sub Topic	Cell Transport Mechanisms
Booklet	Question Paper 4

Time Allowed: **41 minutes**

Score: **/34**

Percentage: **/100**

Grade Boundaries:

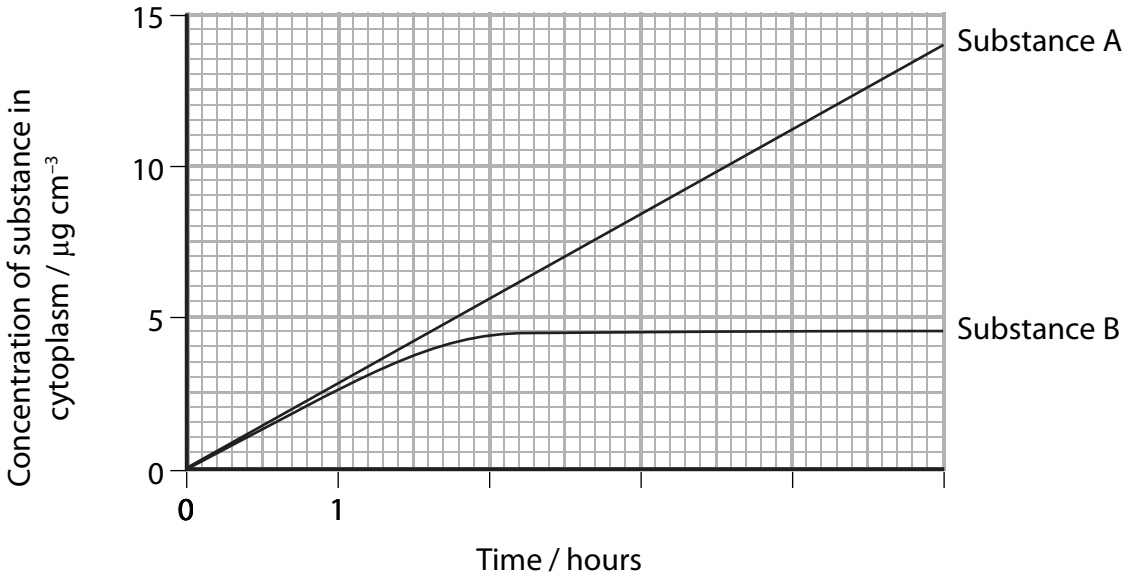
A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 *Amoeba* is a single-celled aquatic organism. Substances in the water can enter the cell by a variety of mechanisms.

An experiment was carried out to compare the uptake into *Amoeba* of substance A and substance B.

Some of these organisms were placed in a solution containing equal concentrations of both substances and kept at 25 °C. The concentration of substances A and B, in the cytoplasm of these organisms, was measured every 30 minutes over a period of 5 hours.

The results of this experiment are shown in the graph below.



(a) Using the information in the graph, compare the uptake of substance A with the uptake of substance B during this period of 5 hours.

(3)

*(b) Substance B enters the cells by diffusion. Describe and explain how the results of this experiment support this statement.

(4)

(c) Substance A enters the cells by active transport. Give **two** differences between active transport and diffusion.

(2)

1 .....

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2 .....

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(Total for Question 1 = 9 marks)

2 During an infection, some white blood cells make glycoproteins which become part of their cell surface membranes. To make glycoproteins, the white blood cells must first synthesise proteins on the surface of their rough endoplasmic reticulum.

(a) Explain how these newly-made proteins end up as glycoproteins on the cell surface membrane.

(5)

(b) There are certain rare blood disorders in which there is a shortage of white blood cells. One potential treatment would be to inject totipotent stem cells into individuals with these disorders.

(i) Explain what is meant by the term **totipotent stem cell**.

(2)

(ii) Suggest why injecting totipotent stem cells may benefit a person with a shortage of white blood cells.

(1)

(iii) Suggest **one** risk to the person receiving the stem cells.

(1)

(Total for Question 2 = 9 marks)

3 Ascorbic acid (vitamin C) is named from the Latin word for scurvy, *scorbutus*.

Scurvy is caused by vitamin C deficiency and used to be a serious concern for sailors. These sailors had no access to fresh fruit and vegetables during long sea voyages.

Sauerkraut (fermented cabbage) contains vitamin C. Ships stored sauerkraut because it does not decompose easily.

Vitamin C is water soluble and is found in cabbage cells. These cells also contain an enzyme, ascorbic acid oxidase, that can oxidise vitamin C.

The table below shows the vitamin C content of sauerkraut and cabbage, treated in different ways.

Food	Treatment	Vitamin C content / mg per 100 g
Sauerkraut	freshly made	41.4
Sauerkraut	stored for 3 months	10.2
Cabbage	raw	32.2
Cabbage	added to cold water and then boiled for 5 minutes	7.6
Cabbage	added to boiling water and boiled for 5 minutes	14.3
Cabbage	stored for 3 months	not possible to measure

(a) Using the information in the table, calculate the percentage loss of vitamin C when raw cabbage was added to cold water and then boiled for 5 minutes.

(2)

..... %

(b) Describe an experimental technique for measuring the vitamin C content of raw cabbage.

(4)

(c) (i) Suggest why the vitamin C content is reduced by boiling cabbage in water.

(2)

(ii) Suggest why less vitamin C is lost when the cabbage is added to boiling water rather than cold water before being boiled for 5 minutes.

(1)

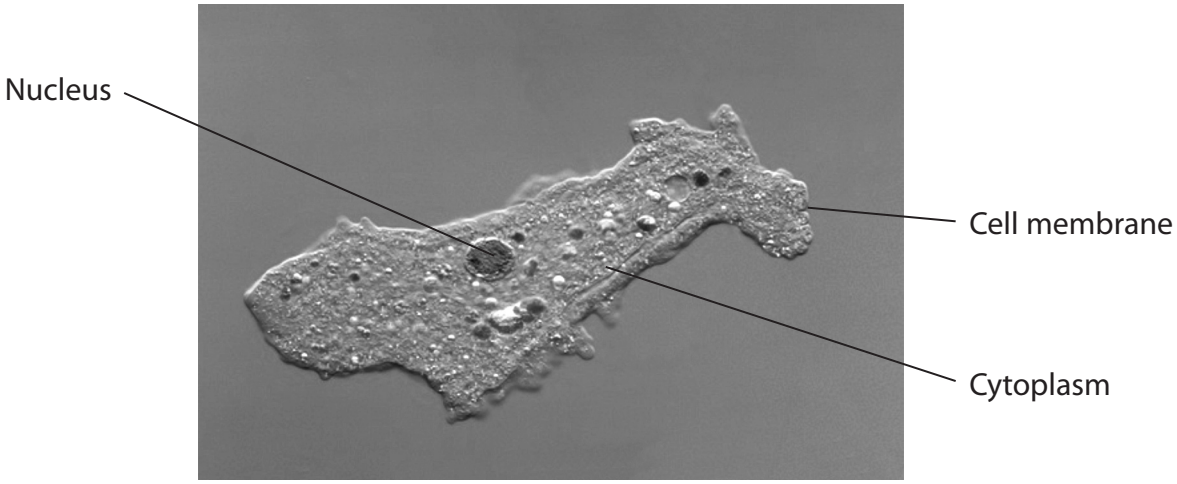
(d) Suggest why sauerkraut was more useful than cabbage on a long sea voyage.

(1)

(Total for Question 3 = 10 marks)

4 An amoeba is a single-celled organism that lives in water. Gas exchange in an amoeba occurs between the water and the cytoplasm.

The photograph below shows an amoeba, as seen using a microscope.



Magnification x800

Dr Jeremy Burgess / Science Photo Library

*(a) Using the information shown in the photograph and your own knowledge, suggest how gas exchange occurs in an amoeba.

(4)

(b) Suggest how oxygen passes from the cell membrane into the centre of an amoeba.

(2)

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(Total for Question 4 = 6 marks)